

## PEER-MEDIATED PROCEDURES TO INDUCE SWALLOWING AND FOOD ACCEPTANCE IN YOUNG CHILDREN

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Two studies demonstrated a functional relationship between a peer modeling procedure and the treatment of feeding disorders with 2 young children. In the first experiment, the use of a peer model treatment package was shown to induce swallowing in a child with dysphagia who had never swallowed food or liquid. In the second experiment, a child who consistently declined food was induced to increase food acceptance as a function of the same peer modeling package. In the latter experiment, a peer-mediated procedure, consisting of rotated opportunities to consume food with a peer, was found to increase consumption more than did modeling alone. The first experiment used a multiple baseline design across solids and liquids, and the second used a multiple treatment design. The results of both experiments are discussed as new and nonaversive treatments for feeding disorders of young children who are imitative.

DESCRIPTORS: eating disorders, dysphagia, peer-mediated establishing operation

The inability to swallow (dysphagia) and food refusal can be debilitating (Illingworth & Lister, 1964). Children with dysphagia who have no anatomical or physiological impediment to swallowing are either unable to swallow or have difficulty with swallowing due to an inadequate behavioral repertoire (Logemann, 1983). The effective treatments reported in the literature have included physical guidance plus contingent reinforcement (Iwata, Riordan, Wohl, & Finney, 1983), gradual shaping in which the particular components are unclear (DiScippio, Kaslon, & Ruben, 1978), and a behavioral package consisting of operant and respondent procedures (Lamm, 1988; Lamm & Greer, 1988). Food refusal is a related disorder and has been treated through reinforcement of consumption of nonpreferred food with preferred food or activ-

ities (Riordan, Iwata, Finney, Wohl, & Stanley, 1984; R. Thompson, Palmer, & Linscheid, 1979).

Another potential source of behavior change for young children is peer modeling (Bandura, 1965). To date, peer modeling has not been tested as a procedure for treating dysphagia and food refusal. Here we report the results of two studies using modeling procedures. In the first, an 18-month-old who had not previously swallowed was taught to swallow food and liquid. In the second, a child who ate at subsistence levels but had no swallowing difficulty was induced to eat a variety of foods using the same procedures. For this study, a peer-mediated procedure was isolated from the modeling procedure.

### STUDY 1

#### *Method*

*Subject.* The subject was an 18-month-old child who, shortly after birth, was diagnosed as having esophageal reflux, which prevented him from in-

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gesting food orally. Treatment consisted of surgical implantation of a gastrostomy tube. The child ingested all liquids and pureed solids through this tube. After the medical staff determined that there were no longer impediments for swallowing, two unsuccessful attempts were made to shift from tubal to oral ingestion in a hospital under medical supervision. In both attempts, the child refused to swallow even though tubal ingestion was stopped for several days. Therefore, medical concern regarding malnutrition forced a return to tubal ingestion.

The child had a rare genetic muscular disease (nemaline myopathy). Little is known of the long-term prognosis of this disease (J. Thompson & M. Thompson, 1980); however, except for the feeding disorder, his prognosis was regarded as good. The child was consistently in the 10th percentile in weight prior to treatment. At 18 months, he could crawl and stand but not walk. He was verbal and imitated his 5-year-old sister.

*Setting.* The child lived with his family (his mother, father, and 5-year-old sister). During meals the 2 children sat alone at the kitchen table facing each other. The sister had no feeding problems. The subject periodically took small tidbits of food or sips of liquid and then removed the solid food from his mouth with his fingers or spit the liquid back into the cup. He responded similarly when presented with food by his mother. He had never been observed to swallow. After the sister completed her meal, solids were pureed in a blender and the gastrostomy device brought out. The boy was then fed via the tube at the table. In the evenings, he also received 8 oz of a high-caloric formula via the gastrostomy tube while asleep.

*Data collection and response definition.* Data consisted of (a) the caloric values of food consumed both orally and by gastrostomy, (b) the number of meals consumed entirely by gastrostomy tube or orally, and (c) body weights taken in the pediatrician's office. A bolus of food or liquid was recorded as orally ingested calories if the food did not reappear from the mouth of the child. A meal was counted as completed if the child consumed the

same portion of food given to the older sibling with less than a teaspoon of food or liquid remaining. The child may have requested and consumed more food, but the consumption of the meal meant that he had consumed the original portion. The child's weight was recorded 1 month prior to intervention, the last day of baseline, the 3rd and 10th days of treatment, and 6 weeks, 2 months, 4 months, and 30 months after intervention. Caloric consumption and portions for the subject and his sister were computed by weighing food and bowls or plates on a postage scale. Following the meal, food on utensils or placemat was scraped into the bowl or plate and weighed again. The difference in weight was converted to calories using a standard source for converting weight of food to calories.

The mother stopped collecting oral caloric intake 2 days after the child had consumed all of his solids and liquids orally. She did, however, continue to assign equivalent portions to both children and to record consumption of meals.

*Reliability.* The mother and senior author collected data on swallows and calories for two training sessions. By the second training session, the mother agreed with the trainer on 100% of the counts. Two additional independent observations were conducted for consumption during treatment. Agreement was 98% and 100%, respectively. Agreement on the total consumption of meals taken orally or by gastrostomy was 100% for two sessions during baseline and 100% for two sessions during treatment.

*Experimental design.* The design was a multiple baseline design across food types: solids and liquids. Although the treatment was conducted with both solids and liquids at the outset of intervention, the use by both children of a training cup with a sipping top did not allow the subject to see the disappearance of the liquid into his sister's mouth. Seeing the disappearance of the liquid appeared to be a critical component. Seven sessions after the solids had been under treatment, a syringe was used to demonstrate the disappearance of the liquid into the sister's mouth. After Session 18, treatment was discontinued and a follow-up or maintenance phase

was conducted for 5 days. The sister continued to eat with the subject. A second follow-up session was conducted 1 month later.

### *Procedure*

**Baseline.** During baseline, both children were given the same portions of the same food. The subject did not swallow during baseline, even with frequent prompts by his mother. The older child consumed her meals in a normal fashion.

**Treatment.** The peer-mediated treatment included the following materials. Identical training cups and utensils were used for both the subject and the peer (his sister). A transparent cylinder (18 in.) was used for token deposit when the peer swallowed, and a second identical cylinder was available for depositing tokens when the target child swallowed.

The peer was trained to feed herself in a slow, deliberate manner. She was then given a token with praise each time she modeled eating and swallowing a bolus of food or drink. At the conclusion of each meal, she exchanged the tokens for candy, additional television time, or art materials. When treatment began, a spoonful of food was placed on the peer's plate. She slowly spooned the food into her mouth. As soon as she swallowed, the mother placed a token in her cylinder and the mother, first author, and daughter applauded. A spoonful of food was then placed on the target child's plate, and he was given 5 s to attempt to feed himself. When he swallowed, the daughter, first author, and mother cheered and a token was placed in his cylinder. If he did not attempt to eat the food, the food was removed from his plate. His sister then had another opportunity to eat and was presented with the same reinforcement. Eating opportunities were rotated in this manner until the sister completed her assigned portion. After the first two meals, the mother and daughter performed the reinforcement operations alone until the 7th day of treatment. The target child's tokens were not exchanged for backup reinforcers.

On the 7th day of treatment, a large basting syringe was used to demonstrate the disappearance

of liquid into the peer's mouth. The first author drew an ounce of orange juice into the syringe, induced the juice via the syringe into the peer's mouth, the peer swallowed, and reinforcement was given. The subject took the syringe, drew some juice into the syringe, squeezed the juice into the peer's mouth, and reinforcement was given to the peer. Thereafter, the subject filled the syringe again, placed it in his own mouth, swallowed the juice, and received reinforcement. Throughout the remainder of the two meals for that day, the syringe was alternated. The next day, the training cup was reintroduced and the child continued to swallow.

At the outset of treatment all mealtime gastrostomy feedings were discontinued. A single gastrostomy feeding was given at night while the child was asleep. No further gastrostomy feedings were given after the 19th day.

### *Results and Discussion*

During baseline the target child did not consume solids or liquids orally. His tubal caloric consumption during baseline ranged from 830 to 1,046 calories. The mean for pureed solids was 260 calories (range, 185–401), and the mean for liquids was 665 calories (range, 645–705). During the treatment for solids alone, oral consumption of solids ranged from 200 to 600 calories and oral consumption of liquids was zero. During the first 2 days of oral consumption of liquids after the syringe treatment, he consumed 210 and 360 calories via liquid. Total caloric consumption for these 2 treatment days for both solids and liquids were 1,115 and 1,250, respectively. Subsequently, all consumption was oral except for the Pedialyte® supplement. Oral caloric consumption data were no longer available.

The subject's weight 1 month prior to baseline was 19 lb 14 oz, and on the last day of baseline it was 20 lb 8 oz (weight increase was controlled by tubal feedings as preparation for the tubal to oral shift). On the 3rd day of treatment he weighed 19 lb 8 oz, and on Day 10 (4 days of consuming all solids and liquids), he weighed 19 lb 8 oz. Six weeks after the intervention began, he weighed 19

lb 9 oz. After 2 months, he weighed 19 lb 13 oz (at this point, the gastrostomy shunt was removed); after 4 months, he weighed 19 lb 14 oz, and after 30 months (age 4), he weighed 25 lb.

The child began swallowing on Day 2 at the third meal; he consumed all solid portions of the meal by swallowing small tidbits. On Days 3 and 5, he consumed two of the three meals (solids only), and on Day 4, he consumed all meals (solids only). On Day 6 and thereafter throughout the treatment, at the 5-day follow-up (under no-treatment conditions), and at the 1-month follow-up, he consumed all solid portions of meals. He consumed no liquid portions until the syringe was introduced 7 days after treatment had begun. After the syringe was introduced, he swallowed all liquid portions at that meal and at subsequent meals during the treatment, the 5-day follow-up, and the 1-month follow-up. The treatment procedures occurred at home under supervision of the child's pediatrician and did not require hospitalization (as had the two prior attempts).

This study suffered from several limitations. First, the oral caloric data continued for only a few days. However, the success of the procedure was clearly apparent in that the child swallowed and did so with solids and liquids independently. The multiple baseline design across behaviors suggested that the procedure was successful even though the data on oral consumption of meals were gathered for only a few days.

The critical nature of the child's dysphagia contributed to limitations in the data collection and design of the study. Specific treatment components needed to be isolated in a more rigorous fashion before conclusions could be drawn regarding the effectiveness of the procedure.

## STUDY 2

### *Method*

*Subject.* The client was a male and was 2 years 5 months old at the beginning of the study. When he entered the preschool 3 months prior to the study, he was not toilet trained, he drank from a bottle, and he did not say any words. In addition,

his parents reported that he ate very little. Suggestions were made to the family to change the environment during meals; however, these efforts were unsuccessful. Thus, it was decided to treat the problem under controlled conditions in the preschool at lunchtime.

The student's weight and height were 23.5 lb and 33.5 in., respectively, prior to baseline conditions (below the fifth percentile in both). Medical examinations revealed no known physical cause for his eating problem, and he had no swallowing difficulty. Consultation with a pediatrician who specialized in nutrition indicated that the child's level of consumption was not life threatening; however, it might affect his growth rate over an extended period.

*Setting.* The study was conducted in a preschool for handicapped children in a metropolitan area. The subject and his peer were taken into an unused classroom for lunch. The 2 children and the trainer sat at one of the classroom tables. When a reliability observer was present, he or she also sat at the table.

*Response definitions and data collection.* Data were collected on (a) the number of food presentations eaten during lunch, (b) the number of food presentations refused, (c) the number of calories consumed during the lunch meal, (d) the duration of the meal, and (e) the child's weekly height and weight.

Each time the subject was presented with a small portion of solid or liquid food, the presentation was tallied as a plus trial if he consumed the entire bite of food or drink and a minus if he did not. The trainer timed the meal from the first food presentation until the end of the last presentation (refusal or consumption). A meal ended after 10 consecutive refusals, or when one item of food was totally consumed, or if the child had to leave to get on the bus. The number of calories consumed during lunch were determined in the same manner as in the previous study. The child's height and weight were measured weekly in the school nurse's office.

*Interobserver agreement.* Independent observations were made during 28 sessions: four for the first baseline, three for the initial peer-mediated operation phase, one during the second baseline,

nine for the second peer-mediated phase, six during the modeling phase, and five during the final peer-mediated phase. Agreement ranged from 93% to 100%, with a mean of 98% across the 28 sessions in which a second observation was conducted. Agreement was calculated by totaling presentation-by-presentation agreement plus disagreement, dividing the sum into agreements alone, and multiplying this product by 100%.

**Baseline procedures.** During baseline sessions, the trainer and subject sat beside each other at the table. Empty eating utensils were placed in front of the child. The trainer placed a teaspoon-sized portion of one type of food or liquid in the child's bowl, plate, or cup. As the trainer placed the food in the child's container she made a statement such as, "Here are some [food name] for [child's name]." The child was given 5 s to eat. After the child swallowed the bite, the trainer said, "Mm, you like the beans, that's good." If he did not eat the entire amount presented, the remainder was removed at the end of the 5-s interval. This was immediately followed by presentation of another type of food. Presentations were alternated across the different foods and drink throughout the session. This provided the child with an opportunity to try each type of food on multiple occasions. The lunch menu was determined by the Head Start program and followed guidelines published by the U.S. Department of Agriculture.

**Peer-mediated phase.** Three peers (2 girls and 1 boy, aged 2 to 4) were selected for participation in the peer-mediated phase because they consistently consumed all of their lunches. For each peer-mediated session, 1 child served as the peer model. The peer was seated at the table across from the subject, each with identical eating utensils. The trainer presented a bite of food to the peer, placing it in the peer's empty bowl. As the trainer did this, she said, "[Peer's name] is going to have some delicious noodles." The trainer watched the peer eat the food, praised the peer for eating, and then presented the same type of food to the subject saying, "[Subject's name] is going to have noodles also." The trainer waited 5 s and then removed any uneaten food from the subject's bowl without

making any comment. If the subject ate the food, the trainer praised the subject by saying, "Mm, you like noodles, that's good." Food presentations were alternated between the peer and the subject throughout the sessions. As during baseline, the presentations were alternated across the different foods and drinks.

**Peer-modeling phase.** All procedures were exactly the same for this phase with one exception. In this phase, the target child and peer were presented the portions at the same time, followed by a 5-s interresponse time. Each student was praised if he or she consumed the portion. Both procedures included vicarious reinforcement, differential reinforcement of consumption, controlled presentations, and the same participants. The single difference was that in the peer-mediated procedure, opportunities to eat and receive reinforcement were rotated between the peer and the target child, whereas in the peer-modeling phase opportunities to eat and receive reinforcement were simultaneously presented to the peer and the target child.

**Design.** The design consisted of a multiple treatment reversal design in which peer-mediated phases were compared with baseline phases and modeling phases. The order of phases was ABACB, wherein A was baseline, B was the peer-mediated procedure, and C was modeling.

### *Results and Discussion*

In the first baseline, the subject ate a mean of 11.9 presentations (range, 1–20) or 33% (Figure 1). He refused a mean of 23.9 presentations (range, 18–29) or 66%. In the first peer-mediated operation, he ate a mean of 24.7 (range, 16–34) or 72%, and he refused a mean of 14.5 presentations (range, 9–20) or 38%. During the second baseline he ate a mean of 16.3 (range, 5–30) presentations or 37%, and he refused a mean of 27.3 (range, 12–14) or 63%. During the second peer-mediated phase, he ate a mean of 28.4 (range, 20–40) or 70%, and he refused a mean of 11.9 presentations (range, 0–21) or 30%. During the peer modeling phase, the child ate a mean of 18.8 (range, 15–25) or 50%, and he refused a mean of 18.6 (range, 9–24) or 50%. In the final peer-mediated phase,

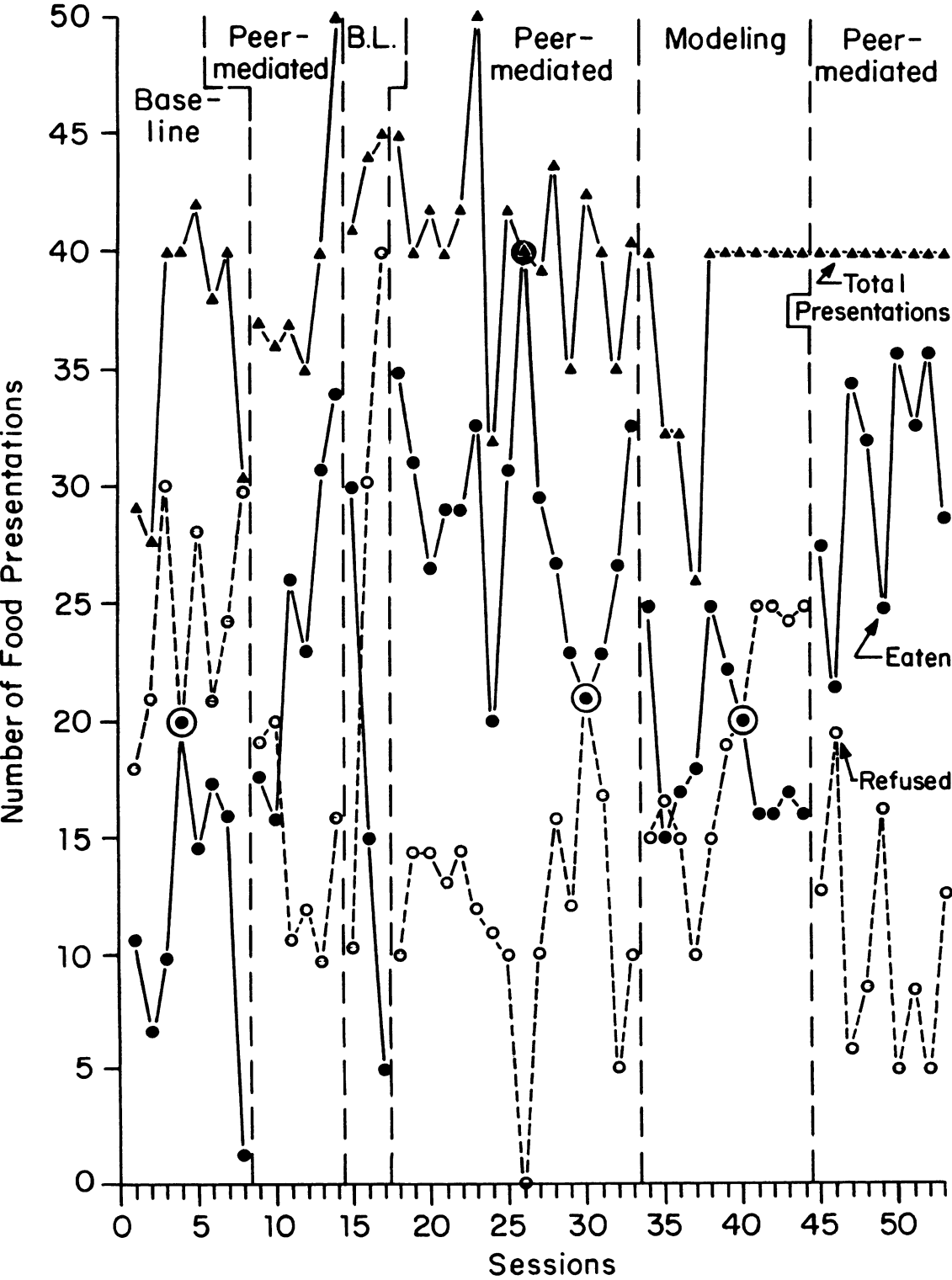


Figure 1. Number of food presentations eaten and refused during baseline, peer-mediated procedures (rotated presentations), and modeling procedures (simultaneous presentations).

the child ate a mean of 30 (range, 21–36) or 75%, and he refused a mean of 9.9 (range, 4–19) or 25%.

The caloric data reflected the food acceptance data but were subject to the caloric value of the food. In baseline, the child consumed a mean of 66 calories per meal, in the first peer-mediated phase 120, in the return to baseline a mean of 92, in the second peer-mediated phase 177, in the peer modeling phase 138, and in the final modeling peer-mediated phase 243 calories per meal. The child increased in height during the study from 33.75 in. to 35 in. and in weight from 23.75 lb to 25 lb.

The study suggests the peer-mediated procedure was a key ingredient in the increase in food consumption. Indeed, the relative increase in responses in the peer modeling phase compared to baseline levels may have been due to a spillover from the prior peer-mediated phase. The acceptance of food declined until it stabilized during the last five sessions of the modeling phase, with a corresponding increase and stabilization of food refusal. The final phase shows that the peer-mediated operation increased consumption over the modeling-only phase.

## GENERAL DISCUSSION

Prior to these studies, there existed a single behavioral procedure for treating young children with dysphagia for whom force feeding and reinforcement with preferred foods are untenable; this was the operant and respondent treatment package introduced by Lamm and Greer (1988). The peer modeling procedure introduced here is another procedure to use with young children with dysphagia. The young children who are treated with these new procedures must meet certain prerequisites, including the presence of normal tongue movements, normal oral anatomical formations and physiology, and imitative repertoires (Lamm, 1988). Given these prerequisites, the peer procedures are less time consuming and require less technical expertise. The same prerequisites and benefits hold for treating children who refuse food.

One potential explanation for the stronger effect

of the peer-mediated procedure is that it served as an establishing operation. Michael (1982) defined an establishing operation as a motivational procedure that momentarily changes the reinforcing or punishing effects of a consequence. In the present studies, rotating the presentations resulted in increasing the reinforcement value of the praise or food for the target student as a result of the peer receiving praise or food following a trial in which the target child did not receive praise. Possibly, this sequence of events enhanced the praise or food as reinforcers. Differential reinforcement, vicarious reinforcement, and the model were present in both procedures, and thus do not explain the differential effect.

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- Received February 22, 1989*  
*Initial editorial decision October 4, 1989*  
*Revisions received December 5, 1989; June 11, 1990*  
*Final acceptance April 16, 1991*  
*Action Editor, Terry J. Page*